# TESS Discoveries.

(Workshop at ETH Zurich entitled "OWL @ ETH - paving the way to the atmospheric characterization of terrestrial exoplanets")

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Natasha E.Batalha
NASA Ames Research Center

## Abstract:

TESS discoveries have already become fruitful targets for HST follow up, and this will undoubtedly continue through the JWST era. In addition to providing targets for atmospheric characterization, TESS' Level One Science Requirement is to measure masses for 50 transiting planets smaller than 4 Earth radii. A full suite of ground based facilities will be working together to optimize the TESS science yield. Somewhat surprisingly though, no study has quantified the accuracy of mass constraints required to yield robust atmospheric properties of small planets. Previous work showed that the mass of a transiting exoplanet could be inferred from its transmission spectrum alone. The method leverages the effect of the planet's surface gravity on the atmospheric scale height, which in turn influences the transmission spectrum. However, significant degeneracies exist between transmission spectra of planets with different masses and compositions, making difficult to unambiguously determine the planet's mass and composition in many cases. I will present the first quantitative answer to this pressing question. Our analysis places definitive limits on how accurate mass constraints need to be in order to unambiguously determine atmospheric composition for a diverse array of planets ranging from terrestrial-size (TRAPPIST-1-like) to mini-Neptunes and hot Jupiters. These results broadly impact the community of scientists working on exoplanets -- from the full breadth of ground based observers conducting TESS follow-up, to those studying planet populations, and finally to those planning atmospheric investigations. This is particularly timely as the STScI Director charged the HST-TESS Advisory committee to report to the Space Telescope Users Committee on how HST can best support follow-up observations of TESS exoplanet discoveries. The community needs to determine optimal strategies for maximizing the rapid scientific return from TESS targets.